



## Seed Storage

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Seeds are considered to be in storage from the moment seed reach to physiological maturity until they germinate or thrown away because they are dead. Proper storage of seeds helps in preserving the viability from harvest to sales and intern protects the producer's investment, profit and reputation. The entire storage can be conveniently divided into following stages:

- Storage on plant (physiological maturity until harvest)
- Harvest, until processed and stored in a warehouse
- In storages (warehouses)
- In transit
- In retail stores
- On the user's farm

The seed quality can be considerably affected at any stages mentioned above, unless sound principles involved in seed storage are practiced and the seeds properly handled. Based on the storability and ability to withstand low moisture levels, seeds of crop species are classified into following two types:

**Orthodox seeds:** Species where seeds can be dried to low moisture content and longevity increases at low temperature, E.g. Rice

**Recalcitrant seeds:** Species where seeds cannot be dried below fairly high threshold moisture content. These are short lived and their viability declines faster at low moisture and low temperature. (Mostly large fleshy seeds)

### Factors Affecting the Storability of Seed

Factors affecting the longevity or seed storability can be broadly grouped as below.

- Pre harvest factors
- Post harvest factors

#### ❖ Pre-harvest Factors

- **Genetic:** The seed storability is considerably influenced by the genetic factors. Some crops are naturally short lived, e.g. Onion, Soybean, etc, where as some are long lived, e.g most of the cereals, Seeds of some species are very long lived such as Lotus. The genetic make-up of the lines/varieties in the same kind also influences the storability. Genetic factors influence seed morphology, seed anatomy and also chemical constitution of seeds which longevity.

- **Pre-harvest rains:** Seed quality will be adversely affected by pre-harvest rains, thus results in poor storability.
- **Provenance:** Weather factors of the seed production location such as temperature, relative humidity, photoperiod etc and soil factors such as fertility and productivity, soil health and water availability etc, during seed crop growth period directly influence the seed storability.

#### ❖ Post harvest Factors

##### Seed factors:

**Initial seed quality:** the seed lots having vigours, undeteriorated seeds store longer than deteriorated lots.

**Moisture content:** seeds should be dried properly to safer moisture levels before storage.

**Seed health:** seeds should be free from seed born diseases and storage pest infestation.

**Storage factors:** Three main factors affecting quality of seed during storage are:

- Moisture
- Temperature
- Pests and Pathogens

**Moisture / humidity:** Seed longevity is significantly increased by lowering the seed moisture content or RH of the seed store. There is a direct relationship between RH of the ambient air and the moisture content attained by the seed stored; recommended limits of seed moisture content for packing are given below:

1. Moisture vapour impervious: 5-6% in vegetables; 8-9% in field crop
2. Moisture vapour pervious: 8% in vegetables; 11-13% in field crops

##### Temperature:

Seed loses vigour and viability faster at higher temperature. Safe range of storage temperature should not exceed 30% for more than 3-4 months. However storage temperature needs to be decided in combination with seed moisture content and duration of storage required. For long term storage, viz, storage of breeding materials and gemplasm both moisture content/RH and temperature should be maintained very low. For different duration of storage, safer moisture content and temperature is given below.

1. Short term: nearly 5% m.c. and 10°
2. Medium term: 5% m. c. and -10°C
3. Long term: 4-5% m.c. and -20° C

#### Thumb Rule for Seed Storage

##### Harrington's thumb rule

- 1 % decrease in moisture content nearly doubles the storage potential of the seed
- 10 degree F decrease in storage temperature nearly doubles the storage life.
- Good seed storage is achieved when the percentage of the relative humidity in storage environment and the temperature in degree Fahrenheit add up to one hundred

##### Pests and pathogen

Incidence of pests and pathogens affect the quality of the seed both before and after harvest. High humidity (more than 70%), warmer temperatures (above 28° C) and mechanical damage of seed favour higher incidence and multiplication of pests and pathogens. In addition, presence of contaminants and roughage also provide congenial conditions for faster multiplication. Incidence of pests and pathogens leads to seed deterioration affect seed quality as below

- Lowers the physical purity

- Lowers the physical appearance and hence marketability
- Reduces vigour and planting value
- Causes seedling abnormality
- Reduces germination

However, the incidence, multiplication of pests and pathogens and their deleterious effect on seed quality can be minimized and by following proper management method at both pre-harvest and post-harvest levels. They are listed below,

- Proper pest control of the seed crop
- Adequate cleaning and processing of the seed
- Proper drying
- Use of clean and proper packaging material
- Cleanliness of the seed store
- Fumigation and pest control of the store
- Seed treatment with pesticides, coating etc.
- Control of RH and Temperature of the seed store
- Reduction of oxygen and increasing carbon dioxide levels

### **Good Storage Practices**

#### **Before storage**

- Check leakage in rain water or sufficiency of drainage facilities
- Cleanliness of the facility and environment around processing plant
- Pesticide treatment
- Security and fire fighting arrangements
- Repairs of the equipments

#### **After receipt of seed grain**

- Inspect for variety, soundness and quality
- Inspect for infestation-type and extent
- Check whether seed/grain has excess moisture, whether it had been heated up in earlier storage and has any musky or rancid odour
- Any grain rendered wet/damaged

#### **During storage**

- Maintaining cleanliness inside the processing plant/warehouse
- Ensuring aeration wherever necessary.
- Monitor increase in seed moisture/insect infestation through regular checking and taking necessary control measures